UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,714	03/19/2004	Yuanping Chen	ARL 03-83	4402

21364 7590 01/02/2008

U S ARMY RESEARCH LABORATORY
ATTN AMSRL CS CC IP
2800 POWDER MILL RD
ADELPHI, MD 207831197

EXAMINER	
QUACH, TUAN N	

ART UNIT	PAPER NUMBER
2826	

MAIL DATE	DELIVERY MODE
01/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/807,714	CHEN ET AL.	
	Examiner	Art Unit	
	Tuan Quach	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-18,25,26,32,33 and 69* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-18,25,26,32,33 and 69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Tuan Quach
Primary Examiner

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 5, 2007 has been entered.

Claim 69 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 69 line 1, the period before "97", "03", "01" is missing.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

For convenient referencing, et al. is omitted.

Claims 13-18, 25, 26, 32, 33, 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rajavel, Han, Chen, and Mitra taken together.

Re claims 13, 25, 32, 69, Rajavel 5,742,089 teaches multilayer structure comprising a silicon based substrate 14, epitaxial layer 18 including II-Vi semiconductor material including combination of two binary alloys such as CdSe/ZnTe but lacks the specific recitation regarding all the various possible compositions as in claim 13 regarding the ternary or quarternary alloys, e.g., of $Cd_{1-z}Zn_z$ Se_xTe_{1-x} .or ternay alloys CdSexTe1-x. The provision of overlayer 26 e.g., HgCdTe is also taught. See column 3 line 45 to column 8 line 65.

Han 7,056,471 B1 teaches homogeneous II-VI quarternary alloys $M_{1-x}M_{2x}A_yB_{1-y}$ having improved characteristics and easy to produce, including the specific recitation of $Zn_{1-x}Cd_xSe_yTe_{1-y}$. The ternary alloys such as Znx Cd1-x Se, ZnxCd1-x, etc. is also taught. The selection of the indices to be between zero and 1 is also taught. See the abstract, column 1 line 5 et seq., column 3 line 60 et seq., column 4 line 4 to column 9 line 65.

Chen (J. Crystal Growth 252 (2003) 270-274) teaches epitaxial material such $CdSe_xTe_{1-x}$ on Si (211) substrate wherein the $CdSe_xTe_{1-x}$ wherein its characteristics of lattice match to a overlayer of HgCdTe is also taught. See the abstract, page 270, 271.

It would have been obvious to one skilled in the art in practicing the above invention in Rajavel to have selected the desired quarternary compounds as claimed since such quarternary compounds are conventional, advantageous, and easy to produce as evidenced by Han. The quarternary materials or ternary materials would

correspond to proper selections of indices in Rajavel as suggested by Han and Chen above. It would have been obvious and would have been within the purview of one skilled in the art to have selected the appropriate values of the indices x and z, given the teachings of Han and Chen evidencing the overlapping range. Additionally, such variation would have been further obvious and advantageous as evidenced by Mitra, 6,208,005, column 5 line 60-65 wherein the variation of the alloy composition would have been conventional and obvious to obtain the desired film characteristics, e.g., desired bandgap. Conversely, although Chen as applied does not recite the inclusion of Zn, such would have been obvious as shown in Han to obtain the quarternay compounds in question. The selection of suitable indices would have been obvious as delineated above or infra.

Note that the provision of lattice matching with a subsequent layer of HgCdTe would have been conventional and obvious as evidenced by Chen above pages 701 and 702.,

Re claim 16 and the case in claim 13 when z is zero, and claim 14 wherein X is Se and X' is Te, and base claim 13 where X is Se and X' is Te, such correspond to the omission or minimization of Zn and would have been obvious when x in Han is maximized and as shown in Rajavel, column 4 lines 14-15 when CdSe and CdTe are employed as the binary compounds thus obviating Zn and as further apparent from the teachings of Chen above where CdSeTe material is shown. Additionally, it is well settled that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257,

191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997). A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). A range can be disclosed in multiple prior art references instead of in a single prior art reference depending on the specific facts of the case. Iron Grip Barbell Co., Inc. v. USA Sports, Inc., 392 F.3d 1317, 1322, 73 USPQ2d 1225, 1228 (Fed. Cir. 2004). The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

Re claims 13-18, 25, 26, 32, 33, and 69, regarding the value of the indices, such selection of the appriopriate value of the indices would have been obvious and would have been encompassed or overlapped in the range taught in Han as delineated above and in view of the optimization as suggested by Mitra above. It is well settled that

in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Re claims 11-12, 23, 24, 30, and claims depending therefrom, concerning the surface defect density, the Office is not equipped to measure the surface defect density in question, such would be inherent in or unpatentable over the prior art above, absent evidence to the contrary as the same layer or substantially similar material is obtained; it is well settled that once the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. Re claims 13-18, 25, 26, 32, 33, 69, the recitation of the overlayer of chalcogenide $Hg_{1-y}Cd_yTe$ overlayer is also taught in Rajavel supra, layer 20/22, column 4 lines 25-58 and the selection or optimization of value for y would have been within the obvious. Re claims 25 and 32, the molecular beam epitaxy is conventional as evidenced in Chen above and in any event corresponds to product-by-process feature and are deemed to be unpatentable over the prior art; it is well settled that for a product-by-process it is the patentability of the product which must be determined. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re

Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted). Alternatively, such source for deposition is well known in the art and as such would have been obvious.

Claims 13, 14, 16, 18, 25, are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen.

Chen (J. Crystal Growth article supra) teaches $CdSe_xTe_{1-x}$ on silicon substrate and the characteristics of being lattice matched to long wavelentht infrared HgCdTe material is also taught. The claims above are anticipated as this correspond to the case when z being zero, X being Se, X' being Te in claim 13, as in claim 14, and in claim 16, and in claim 25 when z being zero. It is apparent that such would encompass the overlayer of HgCdTe layer, e.g., as delineated on page 270 in such application or alternatively, such overlayer thereon and lattice match thereto would have been conventional and obvious as disclosed in Chen, page 270.

Claims 13-18, 25, 26, 32, 33, and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view Rajavel and Han.

Chen does not recite the quarternary compounds in claim 13, 25, 69, or the ternary compounds including interchangebility of S and Se in claims and 32, the y value in claim 18 and 69.

Han is applied above.

Rajavel is applied above and further shows the alternative binary III

Re claims 13-15, 32, the interchangeability and suitability of S and Se would have been obvious in Chen given the teachings of Rajavel column 4 lines 11-18, and Han, column 6 line 66 to column 7 line 26.

Re claims 16,18, 25, 26, 32 and 69, the selection as well such optimization of the x and y indices would have been obvious to one skilled in the art as taugth by Chen above, Fig. 1, pages 270, 272, by Rajavel, column 5 lines 7-40, and Han column 6 lines 55-62, column 7 lines 5. Additionally, it is well settled that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997). A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). A range can be disclosed in multiple prior art references instead of in a single prior art reference depending on the specific facts of the case. Iron Grip Barbell Co., Inc. v. USA Sports, Inc., 392 F.3d 1317,

1322, 73 USPQ2d 1225, 1228 (Fed. Cir. 2004). The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

Applicant's arguments with respect to claims 13-18, 25, 26, 32, 33, 69 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Tuan Quach whose telephone number is 571-272-1717. The examiner can normally be reached on M-F from 8:30 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan Quach
Primary Examiner